In the Claims:

1-33. (Cancelled).

34. (New) A method for the nondestructive and contact-free detection of faults, in a test specimen which is moved relative to a probe having an effective width, comprising the steps of:

using a transmitter to apply periodic electromagnetic alternating fields to the test specimen and using the probe to detect a periodic electrical signal which has a carrier oscillation of which at least one of its amplitude and phase is modulated as a result of a fault in the test specimen if the fault reaches the effective width of the probe,

filtering a signal from the probe using a frequency-selective first filter unit,

sampling the signal which has been filtered using the first filter unit by means of a triggerable A/D converter stage to obtain a demodulated digital measurement signal,

filtering the digital measurement signal using a digital frequency-selective adjustable second filter unit to obtain a useful signal, and

evaluating the useful signal to detect a fault in the test specimen,

wherein said sampling by the A/D converter stage is triggered at an *n*th integer fraction of the frequency of the carrier oscillation, *n* being selected as a function of the fault frequency which is obtained as the quotient of the relative speed between the test specimen and the probe and the effective width of the probe, and wherein the frequency-selective adjustable second filter unit is adjusted as a function of the fault frequency.

35. (New) The method as claimed in claim 34, wherein the test specimen is moved linearly with respect to the probe for producing the relative movement between the test specimen and the probe.

36. (New) The method as claimed in claim 34, wherein the probe is rotated for producing the relative movement between the test specimen and the probe.

37. (New) The method as claimed in claim 34, wherein the transmitter is a coil to which a radio frequency AC voltage in the frequency range from 1 kHz to 5 MHz is applied to induce eddy currents in the test specimen, and wherein the probe is a coil arrangement in which the eddy currents induce the periodic signal.

38. (New) The method as claimed in claim 34, wherein the transmitter is supplied with an AC voltage for generating the periodic electromagnetic alternating fields, the AC voltage being generated from a binary signal by curve shaping.

39. (New) The method as claimed in claim 38, wherein the trigger signal for the A/D converter stage is generated by dividing the frequency of the binary signal that is used to generate the AC voltage for the transmitter by n.

40. (New) The method as claimed in claim 34, wherein n is selected to be inversely proportional to the fault frequency for causing a trigger rate of the A/D converter stage to be at least approximately proportional to the fault frequency.

41. (New) The method as claimed in claim 34, wherein n is selected in such a manner that at least 5 sampling operations are carried out by the A/D converter stage in an interval of time which corresponds to the inverse of the fault frequency.

42. (New) The method as claimed in claim 34, wherein n is selected in such a manner that at most 100 sampling operations are carried out by the A/D converter stage in an interval of time which corresponds to the inverse of the fault frequency.

43. (New) The method as claimed in claim 34, wherein the frequency-selective adjustable second filter unit is automatically adjusted as a function of the fault frequency by the second filter unit being clocked at the sampling rate of the A/D converter stage.

44. (New) The method as claimed in claim 34, wherein the second filter unit has a low-pass filter which removes interference components of the demodulated digital signal at frequencies higher than the fault frequency, the low-pass filter having a cut-off frequency of set higher than the fault frequency.

45. (New) The method as claimed claim 34, wherein the second filter unit has a high-pass filter which removes DC components of the demodulated digital signal, the high-pass filter having a cut-off frequency set lower than the fault frequency.

46. (New) The method as claimed in claim 34, wherein the frequency of the carrier oscillation is selected to be at least ten times the fault frequency.

47. (New) The method as claimed in claim 34, wherein the A/D converter stage, when it is triggered, samples two values in a manner offset by a fixed phase difference for obtaining the digital measurement signal in the form of a two-component signal.

48. (New) The method as claimed in claim 47, wherein the phase difference is m * 360° + 90°, where m is zero or an integer.

49. (New) The method as claimed in claim 47, wherein the two components of the digital measurement signal provided by the A/D converter stage are filtered separately using the second filter unit for obtaining the useful signal in the form of a two-component signal.

50. (New) The method as claimed in claim 49, wherein the two components of the useful signal are taken into account when evaluating the useful signal.

51. (New) The method as claimed in claim 34, comprising the further step of interrupting the application of the electromagnetic alternating field to the test specimen using the transmitter for at least part of each interval between two successive trigger signals for the A/D converter stage.

52. (New) The method as claimed in claim 34, wherein the first filter unit has at least one low-pass filter which is used as an aliasing filter for the sampling by the A/D converter stage.

53. (New) The method as claimed in claim 34, wherein the first filter unit has a high-pass filter which is used to remove low-frequency interference signals.

54. (New) The method as claimed in claim 34, further comprising the step of determining the relative speed between the test specimen and the probe.

55. (New) The method as claimed in claim 34, wherein a predetermined value is used as the relative speed between the test specimen and the probe.

56. (New) The method as claimed in claim 34, wherein a controllable amplifier is connected upstream of the A/D converter stage and is used for changing the signal to an amplitude which is optimally suited to the A/D converter stage.

57. (New) The method as claimed in claim 34, wherein the transmitter uses electromagnetic excitation to deliver sound waves to the test specimen, and wherein the probe detects sound waves in the test specimen and converts the sound waves into said periodic electrical signal.

58. (New) The method as claimed in claim 34, wherein the transmitter radiates microwaves into the test specimen, and the probe converts the microwaves into said periodic electrical signal.

59. (New) An apparatus for the nondestructive and contact-free detection of faults in a test specimen, said apparatus comprising:

a device for detecting the relative speed between the test specimen and the probe,

a transmitter for applying periodic electromagnetic alternating fields to the test specimen,

a probe having an effective width for detecting a periodic electrical signal which has a carrier oscillation with one of an amplitude and a phase that is modulated as a result of a fault in the test specimen if the fault reaches the effective width of the probe,

a frequency-selective first filter unit for filtering a signal from the probe,

a triggerable A/D converter stage for sampling the signal which has been filtered using the first filter unit to obtain a demodulated digital measurement signal,

a drive device for triggering the A/D converter stage at an nth integer fraction of the frequency of the carrier oscillation, n being a function of a fault frequency which is obtained as the quotient of the relative speed between the test specimen and the probe and the effective width of the probe,

a digital frequency-selective second filter unit which is adjustable as a function of the fault frequency and which filters the digital measurement signal for obtaining a useful signal, and

an evaluation unit for evaluating the useful signal for the purpose of detecting a fault in the test specimen.

60. (New) The apparatus as claimed in claim 59, the probe is one of a differential coil and an absolute coil for measuring eddy currents.

61. (New) The apparatus as claimed in claim 59, wherein a binary signal source and a curve shaper are provided for generating a supply voltage signal for the transmitter from a binary signal by means of curve shaping.

62. (New) The apparatus as claimed in claim 61, wherein the drive device has a divider for generating the trigger signal for the A/D converter stage from the binary signal for the curve shaper by dividing said binary signal by n.

63. (New) The apparatus as claimed in claim 62, characterized in that the binary signal source is in the form of a timer (44).

64. (New) The apparatus as claimed in claim 34, wherein the A/D converter stage has a resolution of at least 16 bits.

65. (New) The apparatus as claimed in claim 34, wherein the A/D converter stage has at least one flash converter or SAR converter.

66. (New) The apparatus as claimed in claim 34, wherein the second filter unit comprises a digital signal processor.

67. (New) The apparatus as claimed in claim 34, wherein the A/D converter stage comprises two A/D converters which are connected in parallel, the two A/D converters being triggered at the same frequency and sample in a manner offset by a fixed phase difference to obtain the digital measurement signal in the form of a two-component signal.